DETAILED ACTION

1. This communication is responsive to Amendment filed 02/11/2010.

2. Claims 1, 3-9, 11, 13-38 and 123-127 are pending in this application. Claims 1, 37-38, 123-124 and 126 are independent claims. In Amendment, claims 2, 10, 12 and 39-122 are cancelled and claims 124-127 are added. This Office Action is made final.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claim 38 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 38 cites a tangible program memory for carrying computer readable program code. However, the specification does not explicitly define the type of tangible program memory. The most reasonable and broadest interpretation of the tangible program memory would be possible signal carrier since the signal can carrying computer readable instead of storing the computer readable program code as the non-transitory memory. Therefore, claim 38 is directed to non-statutory subject matter.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-9, 11, 13-25, 27-32, 34-38 and 123-127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simon ("An Overlaying Technique for Solving Linear Equations in Real-Time Computing") in view of Wu et al. (U.S. 6,570,986).

Re claim 1, Simon discloses in Figure 1 a computer implemented method for generating coefficients (e.g. abstract and expression 2 in page 513), the method comprising:

(a) receiving a plurality of input signals (e.g. u and x in Figure and first paragraph of section I. Introduction in page 513);

(b) processing the received input signals to form a system of N linear equations in N unknown variables (e.g. having input of values in expression 1 in page 513)

(c) storing an estimate value for each unknown variable in a processor (e.g. $x_{initial}$ in Figure 1 and "Acceleration of the Computational Procedures" section in page 516);

(d) initializing, in the processor, each estimate value to a predetermined value (e.g. $x_{initial}$ in Figure 1), and establishing, in the processor, a respective auxiliary value for each estimate value (e.g. paragraph right under expression 9 in page 515 and "Finding a Solution for a Set of Linear Equations" section in page 515);

(e) for each estimate value (e.g. can be either individual or vector within the iterated loop for looping as seen in Figure 1 and "Preparing for the Next Cycle" section in page 516):

(i) determining, in the processor, whether a respective predetermined condition is satisfied, the predetermined condition involving the respective auxiliary value (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516 as it meets the condition for moving to the next loop/cycle of computation); and

(ii) updating, the processor, the estimate if and only if the respective predetermined condition is satisfied (e.g. as not meet within threshold/condition in Figure 1), said updating comprises adding a scalar value d to the respective estimate value, or subtracting a scalar value d from the respective estimate value (e.g. expressions 17-22 in page 515);

(f) repeating step (e) a plurality of times (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516);

(g) outputting the estimate values from the processor to provide an estimate of a solution to said system of linear equations for an application in which it is necessary to solve said system of linear equations, said solution to said system of linear equations providing said coefficients (e.g. abstract and "Introduction" section in page 513).

Simon fails to disclose the coefficients are the filter coefficients and the last step of (h) configuring said filter using said provided filter coefficients, said filter being arranged to process a received signal to generate a filtered signal based upon said filter coefficients. However, Wu et al. disclose in Figures 1-3 the coefficients are the filter coefficients and the last step of (h) configuring said filter using said provided filter coefficients, said filter being arranged to process a received signal to generate a filtered

signal based upon said filter coefficients (e.g. component 106 in Figures 1-2 and col. 1 and lines 42-55).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add the coefficients are the filter coefficients and the last step of (h) configuring said filter using said provided filter coefficients, said filter being arranged to process a received signal to generate a filtered signal based upon said filter coefficients as conceptually seen in Wu et al.'s invention into Simon's invention because it would enable to adaptively cancel out echo signal (e.g. col. 1 lines 20-41).

Re claim 3, Simon further discloses in Figure 1 scalar value d is updated in a predetermined manner (e.g. "Transformation to Residuals" section in page 515).

Re claim 4, Simon further discloses in Figure 1 scalar value d is updated when and only when step (c) updates no estimate values (e.g. Figure 1).

Re claim 5, Simon further discloses in Figure 1 updating divides d by a scalar update value (e.g. expressions 11-16 in page 515).

Re claim 6, Simon further discloses in Figure 1 the scalar update value is equal to a power of two (e.g. binary value in expressions 11-16 in page 515).

Re claim 7, Simon further discloses in Figure 1 the scalar update value is equal to two (e.g. as power to one in binary value in expressions 11-16 in page 515).

Re claim 8, Simon further discloses in Figure 1 each of estimate values is initialised to be equal to zero (e.g. $x_{initial}$ in Figure 1).

Re claim 9, Simon further discloses in Figure 1 the respective predetermined condition for each respective estimate value does not involve the respective estimate value (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516).

Re claim 11, Simon further discloses in Figure 1 auxiliary values form an auxiliary vector Q (e.g. expressions 11-22 in page 515).

Re claim 13, Simon further discloses in Figure 1 a plurality of auxiliary values are associated with each estimate value (e.g. expressions 10-22 in page 515).

Re claim 14, Simon further discloses in Figure 1 the predetermined condition for a respective estimate value involves the maximum amongst the plurality auxiliary values (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516).

Re claim 15, Simon further discloses in Figure 1 the minimum value is compared with a threshold value (e.g. as comparing with as seen in Figure 1 and “Preparing for the Next Cycle” section in page 516).

Re claim 16, Simon further discloses in Figure 1 the condition is satisfied if the minimum value is less than the threshold value (“Preparing for the Next Cycle” section in page 516 and Figure 1).

Re claim 17, Simon further discloses in Figure 1 the plurality of auxiliary values for a respective estimate value consist of a first auxiliary value, and second auxiliary value which is the negative of the first auxiliary value (e.g. lower and upper bound by computing the norm in Figure 1 and “Preparing for the Next Cycle” section in page 516).

Re claim 18, Simon further discloses in Figure 1 the threshold value for the nth unknown variable is the scale value d multiplied by the coefficient of the nth unknown variable in the nth equation (e.g. "Introduction" section in page 515).

Re claim 19, Simon further discloses in Figure 1 one of a plurality of update is selected in the condition is satisfied (e.g. expressions 10-22 in page 515).

Re claim 20, Simon further discloses in Figure 1 the scalar value d is added to the respective estimate value if the condition is satisfied and minimum value is the first auxiliary value (e.g. as next cycle of operation and “Preparing for the Next Cycle” section in page 516).

Re claim 21, Simon further discloses in Figure 1 the scalar value d is subtracted from the respective estimate value if the condition is satisfied and minimum value is the second auxiliary value (e.g. by the direction of error E in expression 11 in page 515).

Re claim 22, Simon further discloses in Figure 1 the first auxiliary value for the nth unknown variable is initially set to be equal to the negative of the right hand side of the nth equation (e.g. as b_{old} in expression 16 in page 515).

Re claim 23, Simon further discloses in Figure 1 the first auxiliary value for the nth unknown variable is initially set to be equal to the negative of the right hand side of the nth equation (e.g. as b_{old} in expression 16 in page 515).

Re claim 24, Simon further discloses in Figure 1 the respective first and second auxiliary values are updated if the condition is satisfied (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516).

Re claim 25, Simon further discloses in Figure 1 the first and second auxiliary values associated with each estimate value are updated if the condition is satisfied (e.g. Figure 1 and "Preparing for the Next Cycle" section in page 516).

Re claims 27-29, Simon fails to disclose in Figure 1 each estimate value is represented as a fixed point binary word; a floating point binary word; or a complex number. However, the examiner takes an Office notice that the value is represented as a fixed point binary word; a floating point binary word; or a complex number is well known in the art of the technology and widely used in many practical applications.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to have the value is presented as a fixed point binary word; a floating point binary word; or a complex number into Simon's invention because it would enable to enhance the system flexibility.

Re claim 30, Simon further discloses in Figure 1 the scalar value d is updated such that the algorithm updates the estimate values in a bitwise manner, beginning with the most significant bit (e.g. Figure 1 and "Preparing for the Next Cycle" section in page 516).

Re claim 31, Simon further discloses in Figure 1 step (d) is carried out until a predetermined condition is satisfied (e.g. Figure 1 and "Preparing for the Next Cycle" section in page 516).

Re claim 32, Simon further discloses in Figure 1 predetermined condition is a maximum number of iterations without an update to the scalar value d (e.g. Figure 1 and "Preparing for the Next Cycle" section in page 516).

Re claim 34, Simon further discloses in Figure 1 the accurate solution of the equations is known to lie between upper and lower bounds, and the algorithm seeks a solution between upper and lower bounds (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516 by computing the norm).

Re claim 35, Simon further discloses in Figure 1 estimate values are initialised to a value which is within upper and lower bounds (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516 by computing the norm).

Re claim 36, Simon further discloses in Figure 1 estimate values are initialised to a value positioned at the midpoint of upper and lower bounds (e.g. Figure 1 and “Preparing for the Next Cycle” section in page 516 by computing the norm).

Re claim 37, it is a computer apparatus claim of claim 1. Thus, claim 37 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 38, it is a tangible program memory claim of claim 1. Thus, claim 38 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 123, it is a computer method claim of claim 1. Thus, claim 123 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 124, it has similar limitations as cited in claim 1. Thus, claim 124 is also rejected under the same rationale as cited in the rejection of rejected claim 1. In addition, Simon fails to disclose the filter and a filter coefficient setting circuit wherein the filter coefficient setting circuit is configured to receive signals from a first device and second device respectively. However, Wu et al. disclose in Figures 1-3 the filter and a filter coefficient setting circuit (e.g. components 204 and 208 in Figures 1-2) wherein the

filter coefficient setting circuit is configured to receive signals from a first device and second device respectively (e.g. the speaker and microphone respectively in Figures 1-2). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add the filter and a filter coefficient setting circuit wherein the filter coefficient setting circuit is configured to receive signals from a first device and second device respectively as conceptually seen in Wu et al.'s invention into Simon's invention because it would enable to adaptively cancel out echo signal (e.g. col. 1 lines 20-41).

Re claim 125, Simon further discloses in Figure 1 processing the received signals to form a system of N linear equations in N unknown variables comprises auto-correlating one of the received signals (e.g. within matrix A relatively with itself in Figure 1 as diagonal) and cross-correlating the signals received from the first device to the second device (e.g. within matrix A relatively with itself in Figure 1 as off-diagonal).

Re claim 126, it has similar limitations as cited in claim 124. Thus, claim 126 is also rejected under the same rationale as cited in the rejection of rejected claim 124 wherein the first and second devices are the speaker and microphone respectively (e.g. Figures 1-2 in Wu et al.).

Re claim 127, it has similar limitations as cited in claim 125. Thus, claim 127 is also rejected under the same rationale as cited in the rejection of rejected claim 125.

Allowable Subject Matter

7. Claims 26 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments with respect to claims 1, 3-9, 11, 13-38 and 123-127 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHAT C. DO whose telephone number is (571)272-3721. The examiner can normally be reached on Tue-Fri 9:00AM to 7:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis Bullock can be reached on (571) 272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Chat C. Do/
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